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10/047,978	01/13/2002	Steven Teig	SPLX.P0089	5041

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EXAMINER

WHITMORE, STACY

ART UNIT PAPER NUMBER

2812

DATE MAILED: 04/21/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/047,978

Applicant(s)

TEIG ET AL.

Examiner

Stacy A Whitmore

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 27-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27-34 and 38-45 is/are rejected.
- 7) ☒ Claim(s) 35-37 and 46 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

DETAILED ACTION

1. The Examiner thanks applicant for the aid and professionalism in helping the examiner with information concerning related applications.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. <sup>34</sup> Claims 27- 24, and 38-45 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang (US Patent 5,784,289).

2. As for claims 27 and 38, Wang '289 disclosed the invention as claimed, including a method of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig.'s 8-10];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [abstract; col. 2, line 65 – col. 3, line 11]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 6, lines 23-46].

3. As for claim 28 and 39, Wang '289 disclosed wherein, for each particular net, the edge-intersect/ path-use probability for each particular edge/path equals the number of potential routes of the particular net that intersect/use the particular edge/path divided by the number of potential routes of the particular net [col. 6, especially lines 63-65].

4. As for claim 29 and 40, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities for each particular net comprises:

- identifying the set of sub-regions that contain each particular net's pins [abstract];
- based on each particular net's identified set of sub-regions, retrieving the particular net's edge-intersect/path-use probabilities from a storage structure [abstract and col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides on a software program which is stored on a storage structure].

5. As for claim 30 and 41, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities comprises:

- for each particular net:
  - identifying the set of potential routes for the particular net [abstract];
  - for each particular edge/path, computing the number of potential routes of the particular net that intersect/use the particular net/path [abstract; col. 6];
  - dividing the computed number of each particular edge/path by the number of potential routes of the particular net [abstract; col. 6].

6. As for claim 31 and 42, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises retrieving the set of routes from a storage structure [col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides on a software program which is stored on a storage structure].

7. As for claim 32 and 43, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises generating the set of routes after partitioning the IC region [abstract; col.'s 5-6].

As for claim 33 and 44, Wang '289 disclosed for each particular edge/path, computing a sum of the probabilities identified for the particular edge/path for all the nets [col. 6, lines 54-56];

using the summed probabilities for the edges/paths to predict congestion of the edges/paths [col. 6, lines 63-67; col. 7, lines 1-4];

routing the nets based on the predicted congestion of the edges/paths [col. 11, lines 1-12].

8. As for claim 34 and 45, Wang '289 disclosed wherein using the identified probabilities to identify routes for the nets comprises:

using the edge-intersect/path-use probabilities to predict congestion of the edges/paths [col. 6];

based on the predicted congestion, identifying routes for nets [col. 6].

#### Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 27 and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by Scepanovic et al. (US Patent 6,058,254).

10. As for claims 27 and 38, Scepanovic '254 disclosed the invention as claimed, including a method of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig. 4, sub-regions are the boxes identified by e.g. (j=0, l=0) or (j=0, l=1); col. 5, lines 25-27];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [fig. 4; col. 5, line 25 – col. 6; fig. 3, and col. 3; the net 116-118 crosses sub-regions];  
and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 5, lines 1-18; the probability use used to form a better routing solution].

11. Claims 35-37 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to disclose either singularly or in combination using the potential routes and the edge-intersect/path-use costs to formulate a linear-programming ("LP") problem; and

solving the LP problem to identify one route for each net.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stacy A Whitmore whose telephone number is (703) 305-0565. The examiner can normally be reached on Monday-Thursday, alternate Friday 6:30am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Stacy A Whitmore

Patent Examiner

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SAW

April 17, 2003